TÆNIA SOLIUM.

BY

D. G. WOODVINE, M. D.

TÆNIA SOLIUM.

BY

D. G. WOODVINE, M. D.,

BOSTON.

Reprinted from Transactions of State Homœopathic Medical Society, 1868.

ALBANY:
VAN BENTHUYSEN & SONS' STEAM PRINTING HOUSE.
1868.

TÆNIA SOLIUM.

In the following paper I do not presume to give the profession any new ideas on the subject of the Tænia solium. It is known that investigations upon the manner of its development, by the mass of the profession, have been limited. The subject is a somewhat isolated one, and treatises upon it are not numerous. In fact it has been but a few years since its stages of development have been properly understood.

It is my design to give a simple and concise explanation of these various stages of development, beginning with the ovum, together with the diagnosis, prognosis and treatment. I am obliged to acknowledge the valuable aid I have received in investigating this subject from the works of Küchenmeister, Von Siebold and Weinland.

The tænia solium is improperly named, since many are sometimes found in the same intestine. Küchenmeister in making a series of experiments upon a murderer condemned to death, administered 72, 60, 36, 24 and 12 hours before execution, 12, 18, 15, 12 and 18 specimens of cysticercus cellulosæ, partly in rice or vermicelli soup, cooled to a blood heat, and partly in blood puddings. He says that "on dissection forty-eight hours after execution, I found ten young tænia."

The tænia solium is an hermaphrodite. Its development, to be easily understood, I shall divide into two periods. The first period is that which includes all the phenomena surrounding the ovum, from its introduction into the stomach until it has attained the highest point of development possible in the animal that has received it. The second period is that which includes all the phenomena connected with the product of the first period of development after it is received into the stomach until it is fully developed. These two periods are divided by Küchenmeister into five stages of development, viz:—"First, the sexual animal—proglottis; second, the grand nurse—six hooked embryo; third, the resting scolex—cysticercus cellulosæ in the parenchyma, areolar tissue and cavities of the body." The phenomena of these three stages complete the first period of development. "Fourth, the active scolex—nurse, that is, the cysticercus cellulose, which will become a tapeworm in the intestine; and fifth, the strobila—the series

of segments of tænia solium produced by gemmation from fourth—tænia solium." The phenomena of these last mentioned complete the second period.

The proglottis is a segment or capsule which contains nothing but the male and female generative apparatus. Figure 1, 2 and 3. Eggs are produced by this apparatus, which pass into the external world and being swallowed by some animal are digested, the six hooked embryo set free, and thus the first stage in the process of development is attained. Figure 4. The second is the grand nurse, or six hooked embryo. This is a product of the proglottis, formed by a union of sperm and germ cells. The proglottis having the power of motion, extricates itself from the mass in which it is deposited, crawls upon vegetables, discharges its eggs naturally or by accident. These are swallowed by animals, the shells destroyed, and the six hooked embryo set free. As soon as this is accomplished the grand nurse draws together the two centre hooks, and performs its duties in the process of development by boring its way through the stomach into the abdominal cavity, or into the portal vein, or it may, after passing into the abdominal cavity, bore on still further, until it gets into the general circulation. It is here carried along with the current of blood to some remote part of the system, and if not injured in its passage, it continues its migration still further. If the hooklets are worn off, it then becomes a permanent resident of the capillaries, producing irritation and inflammation, and finally becomes enveloped in a cyst. When it takes up its abode in serous cavities, it does not become thus enveloped. This brings us to the third stage in the process of development, which is called the resting scolex, or the cysticercus cellulosæ. It has been found in different portions of the human body, viz., the brain, the eye, liver, vena porta, heart and muscular tissue.

The process of development is rapid (see the New American Cyclopædia), "so that in a week or two the cyst may be recognized by the naked eye. The spines or hooklets now drop off, the primary vesicle goes on absorbing nutriment, and by the second or fourth week there grows out a protuberance from its internal surface, which soon takes the form of the head of the future tænia. Figure 5. Upon this there springs up a double circle of small hairs, which, in six weeks, become the complete coronet of hooks. Figure 6. The neck now begins to extend, but the head still remains enclosed in the bladder until the whole animal

is set free." The cysticercus cellulosæ may, for want of an opportunity of development, remain in its resting place until it dies of old age. This brings us to the consideration of the fourth stage in the process of development, or the active scolex.

The hog, if I mistake not, is the animal above all others in which the cysticercus cellulosæ is found. Its habits are too well known to need description. Pork is eaten by a large portion of mankind, and consequently is the chief means of developing the tape worm. The resting scolex, coming under the influence of digestion, is set free, becomes the active scolex, attaches itself to the walls of the intestines, and makes man the fruitful field of an unwelcome product. I am not satisfied, however, that pork is the only means by which man becomes acquainted with the cysticercus cellulosæ. In a case of tænia solium, which I treated a few months since, the gentleman was opposed to the use of pork in any form, and yet he was discharging proglottides every day or two. Upon inquiry into his habits of eating, he told me that he was very fond of ox liver just warmed over the coals; in fact, said he, "I can eat it very well raw." I do not know, but in this case the measle was developed in the hog, for the careless habits of our market men make it possible to transfer the cysticercus cellulosæ, if the knife is not cleansed after cutting pork before using it to cut other meat. There seems to me, also, to be a possibility, — and I know of no reason to the contrary, — that the ox may have swallowed the grand nurse in water, or have eaten it upon vegetables. The habits of the hog are of such a character as to be convincing in regard to the probability of finding the measle more frequently in them than in other animals. We have abundant proof that where persons are connected with pork packing establishments, and make a practice of eating freshly salted pork raw, many of them are troubled with tape worm. That the active scolex only makes an attachment to the walls of the intestine, I think we may doubt. I have recently become acquainted with a case where the man discharges the proglottides by the mouth; concomitant symptoms are convulsions and vomiting. I cannot, for myself, see how there can be an attachment to the walls of the intestine and the segments be discharged from the mouth. The greater portion of tænia are undoubtedly in the bowels, and this goes far to prove that the active scolex forms its attachment there. Figure 7. Having made this attachment, we are brought to consider the fifth and last stage in the process of development,

viz., the strobila, or series of segments. Figures 1, 2 and 8. From the head grow one after another numerous joints, which finally make up the mature worm. The length of tænia solium varies, the average being about twenty-five feet. Küchenmeister says: "I counted eight hundred and twenty-five segments in one case, and in which the specimen was ten feet two inches in length." This same author says: "From the two hundred and eightieth segment onwards there is seen, in the median line of the cestoidea, a simple brownish yellow canal, with short, lateral offshoots, toward which two transverse, slightly colored, lines (seminal cord and vagina) run from the sides. At the three hundred and seventeenth segment commence the first indications of the alternating pori genitales, in the form of prominences; at the three hundred and fiftieth, the pores themselves become distinct. (Figure 3, A.) Between the two hundred and eightieth and the four hundredth segments an accumulation of small, yellowish, loose aggregations of corpuscles lying in the parenchyma is seen gradually becoming more distinct; from the four hundred and twentieth segment onwards, the upper end of the median canal (uterus, figure 3, E) becomes enlarged and clubbed, and the first commencement of the so-called ova collect in the lateral offshoots, which at first appear to stand more closely in the upper than in the lower half of the segment. From the five hundredth segment, the lateral shoots exhibit a tendency to give off smaller shoots or excrescences towards the sides, but these always appear to be larger and more numerous in the upper half of the segment, and never reach directly to the main stem. From the six hundredth segment is seen one shelled, clear ovum, which moves readily in the offshoots of the uterus after the preparation has been treated with acetic acid. From the six hundred and twenty-fifth we find two shelled ova, which constantly become thicker and darker colored, until in the six hundred and fiftieth and seven hundredth segments they nearly resemble the mature, although still mixed with an abundance of immature ova, and then exhibit the little embryo with its six hooklets."

Since the above was written I have had an opportunity to investigate this subject more extensively, having had three cases under my care. Case 1, brought me several fresh proglottides for examination. I cut off a portion of the segment near the median line as thin as possible and with the aid of a Tolles $\frac{1}{5}$ objective discovered an abundance of what I suppose to be sperm and germ cells, but no distinct ova. Case 2, by request brought me similar

specimens with which I determined to pursue a different course. A segment was placed in pure water and lacerated lengthwise through and on both sides of the median line with needles, supposing that the true ova would escape or float out into the water. After this had been accomplished I removed the segment and put the water into cells and examined it under the microscope and found that I had succeeded in obtaining large quantities of the eggs. They have in comparison to their size a very thick shell and under a fifth objective magnified seven hundred diameters the six hooked embryo may be seen, though not distinctly. The size of the ova by actual measurement is $\frac{1}{530}$ of an inch in diameter and they are of a spherical form. (Figure 4.) The thickness of the shell is the $\frac{3}{10000}$ of an inch. No. 3, seemed different in appearance from the others in this respect. The genital organs could be seen very plainly. I had supposed this from appearance to belong to the same class, until the microscope revealed to me my mistake. Figure 9. The eggs instead of being spherical are oblong or oval measuring the $\frac{1}{530}$ of an inch in length and the $\frac{1}{660}$ of an inch in width and correspond to what Küchenmeister calls tænia mediocanellata. I mentioned this little experience to show how important the microscope is in deciding even in regard to the nature of tænia.

I have now traced out the tænia solium from the ovum, through all its various styles of development, back to the grand nurse.

Still later I have received the Quarterly Journal of Microscopical Science for July, and find the following statement from Lecture No. VII, on Invertebrata, before the Royal College of Surgeons, by Prof. T. H. Huxley, F. R. S.: "The common tape worm is not T. solium but T. mediocanellata, which has no hooks. (Figure 10.) Its hydatid or pupa harbors in the ox. A man who liked mutton seemed in spite of this discovery to be safe, but now, alas! a hydatid has been found in mutton chop." The facts that bring forth this remark are unknown to me.

Diagnosis.—I can do no better than to give the result of Seegar's experiments, who kept a statistical table of one hundred patients suffering from tape worm. Sixty-eight times there were cerebro-spinal affections and partial or general convulsions (for example, epilepsy, hysteria, melancholy, hypochondria, abdominal spasms, dyspnœa and convulsive coughing), which may even rise to maniacal attacks and mental weakness; forty-nine times nausea, even with vomiting and fainting; forty-two times various pains in

the abdomen; thirty-three times disordered digestion and irregular evacuations; thirty-one times irregular appetite and voracity; nineteen times periodical, habitual headache, usually on one side; seventeen times sudden colic; sixteen times undulatory movements in the abdomen up to the chest; fifteen times dizziness or delusion in the senses or defects in the speech; and eleven times shifting pains in various parts of the body. All these symptoms, however, are deceptive, the only true and reliable symptom being the discharge of the segments in various ways.

The prognosis is not favorable, inasmuch as it has not yet been proved that the embryos cannot make their escape into the intestine and become converted into the cysticercus cellulosæ.

Treatment.—I shall not attempt to give the multitude of remedies that have been used to expel the tape worm, but mention those that have proved to be the successful ones. In the cases treated by myself, I have followed the plan of Prof. Beale, of London, in the use of the etherial oil of male fern. I request the patient to fast for twenty-four hours, after which I give two drachms of the oil of male fern in eight ounces of mucilage, followed in one hour and a half by two ounces of oleum ricini, and the worm is usually expelled. Kousso in a similar manner has been used by many successfully; also an emulsion of pumpkin seeds. Spigilia, pomegranite bark and cina have some reputation. For corroborative evidence of the efficiency of the etherial oil of male fern, I refer to the British Journal of Homœopathy, Vol. XXII, page 330, and Prof. Beale's late work on Microscopy in Practical Medicine, page 264.

In the British Journal of Homœopathy, Vol. XXIII, page 441, I find the report of a case successfully treated with stannum and sulphur in third and sixth dilutions. When the cysticercus cellulosæ makes its resting place in the eye, it may sometimes be safely removed by the knife.

Proglottides of a Tænia mediocanellata, invarious stages of contraction. Leuckart

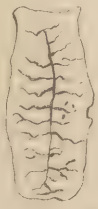
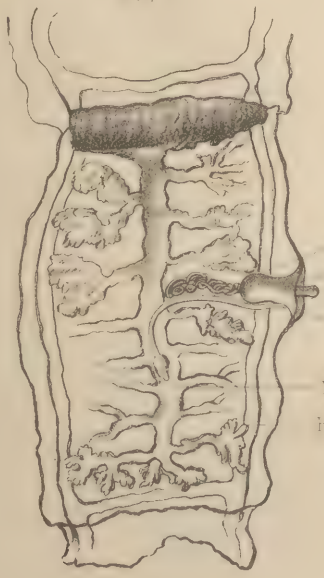
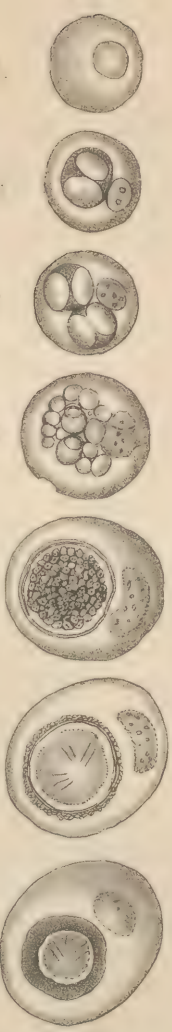


Fig. 2

Proglottis of a Tænia solium Natural size. Kuchenmeister.



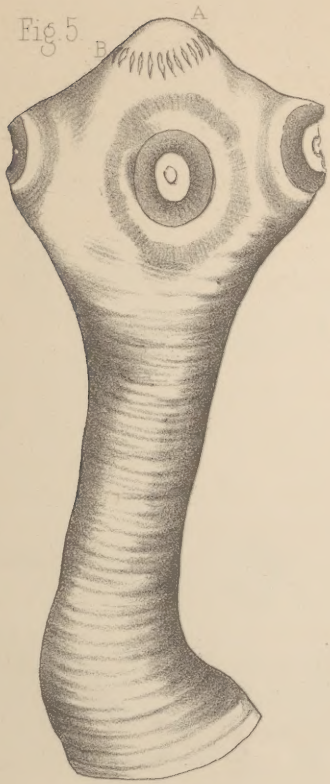


A Ovum of Tænia solium previous to segmentation. B C D E Segmentation in the impregnated ovum. F Appearance of the early embrio with its three pairs of silicrous spikelets. G Mature ovum. Embrio inclosed within its leathery case. Leuckart.

Proglottis of Tænia solium magnified. A. Genital pore, with its preputial cover or sheath-skin, B. Lemniscus, C The oviduct, D. The seed vessel, E The uterus, F. The water vascular system of vessels. Rokitansky.

Charles Van Beethuysen & Sons

Fig. 5



A. Head and neck of Tænia solium.
B. Circle of hooks.

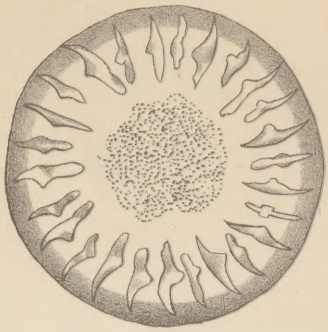
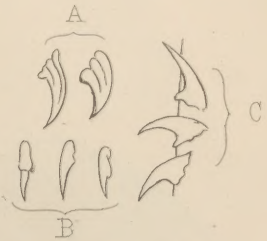


Fig. 6.

Circle of hooks, highly magnified.

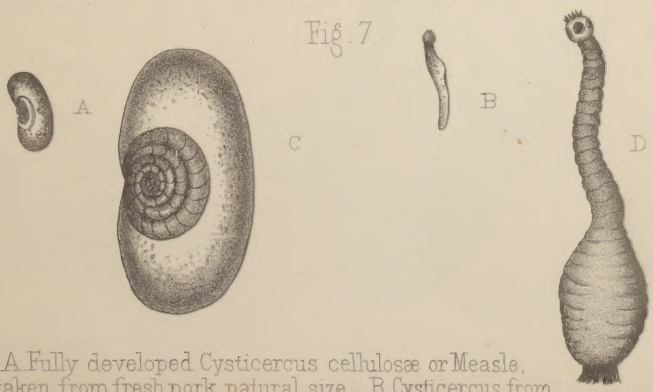
Leuckart.



A. Lateral views of separate hooklets.
B. Inferior or concave border of hooklets.
C. Illustration of the movements and position of the hooklets, the vertical line running through the fixed point of each of the three hooks.

Chambers Ency.

Fig. 7.

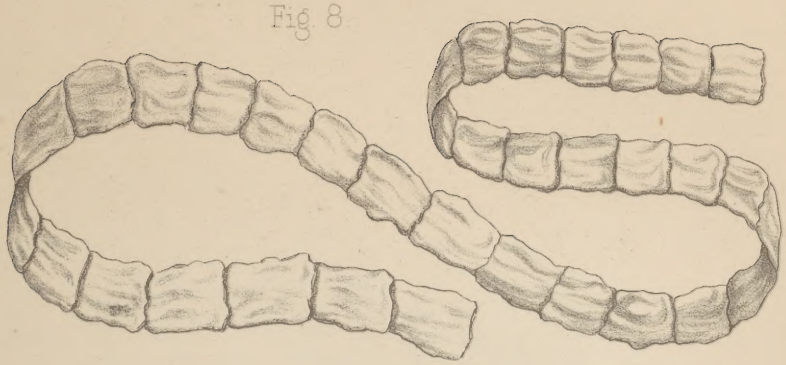


A. Fully developed Cysticercus cellulosæ or Measle, taken from fresh pork, natural size. B. Cysticercus from salted pork, C. Same as A, magnified three diameters.
D. Same as C, with the head and body withdrawn from the caudal vesicle.

Chambers Ency.

Charles Van Beschuysen & Sons.

Fig. 8



Strobila or series of segments.

Dacosta.

Fig 9

Eggs of Tænia mediocanellata.

Kuchenmeister.

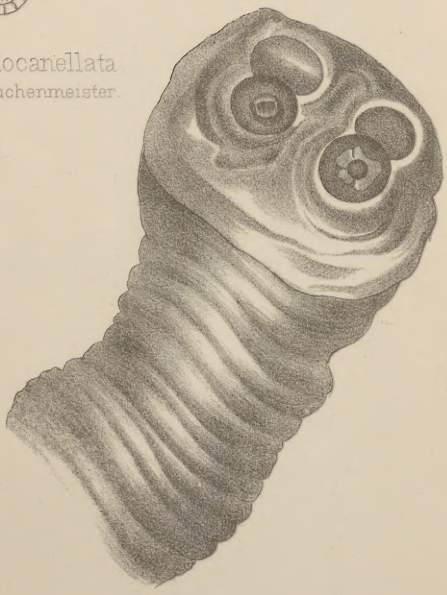


Fig 10.

Head of Tænia mediocanellata.
Showing four large sucking-discs.

Aitken's Practice

Charles Van Benthuysen & Sons